



ATTO Technology, Inc.

ATTO FastFrame Network Interface Adapter Installation and Operation Manual

FastFrame NS14

10GbE Quad Port PCIe 2.0 Network Interface Adapter

FastFrame NS12

10GbE Dual Port PCIe 2.0 Network Interface Adapter

FastFrame NS11

10GbE Single Port PCIe 2.0 Network Interface Adapter

FastFrame NT12

10GBASE-T Dual Port PCIe 2.0 Network Interface Adapter

FastFrame NT11

10GBASE-T Single Port PCIe 2.0 Network Interface Adapter

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1 ATTO FastFrame NIC Features & Overview

FastFrame 10Gb Ethernet NICs provide flexible and scalable unified LAN and SAN storage connectivity.

Built on industry-leading Intel® silicon for universal usability, ATTO FastFrame NICs lead in high performance I/O connectivity for Mac OS X environments while offering broad support for Windows and Linux server and workstation operating systems. They provide reliable, inexpensive, fast network access to block storage via iSCSI, with lossless Ethernet (CEE) and Data Center Bridging (DCB) for improved iSCSI quality of service. ATTO FastFrame NICs comprise a full range of products for flexible design—single, dual, and quad-port configurations, as well as support for Direct Attach Copper.

New to the FastFrame family, ATTO FastFrame 10GBASE-T NICs operate with existing structured shielded or unshielded twisted pair copper cabling familiar to network professionals.

Strong reseller & OEM programs plus exceptional support provided by ATTO make the FastFrame line of NICs the choice for system builders seeking a lasting footprint in storage-intensive and data center markets.

- Extensively tested and optimized by ATTO for high-performance in Media & Entertainment applications, as well as applications with similar profiles such as medical imaging, and oil & gas
- 10GbE cards, ports & cabling are backwards compatible to Gig-E for staged upgrades or future-proofing— and you can run 10GBASE-T NICs with Cat6a cabling that's already in place
- 30% lower power rating means lower energy costs, lower data center maintenance fees, and less heat to dissipate

Getting started

In general, to install the ATTO Network Interface Adapter, you must:

- 1 Ensure you have the equipment and software you need for the installation:
 - FastFrame NIC
 - ATTO FastFrame NIC drivers
 - OS X driver can be found on the FastFrame NIC Installation CD
 - Windows and Linux drivers must be downloaded. Refer to [Install Drivers](#) on page 14.
 - A computer with an available expansion slot



Note

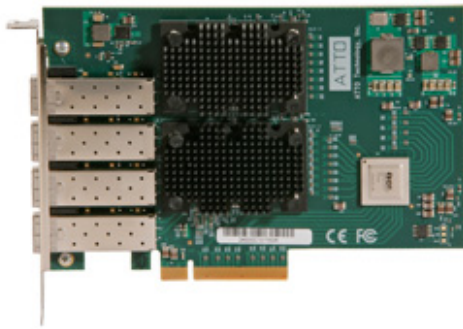
Install your FastFrame NIC into a PCIe 2.0 x8 expansion slot for best performance

- Storage, cables and connectors
<http://www.attotech.com/products/cable-finder/>

- 2 Install the FastFrame Adapter. Refer to [Hardware Installation](#) on page 8.
- 3 Install drivers for your operating system. Refer to [Install Drivers](#) on page 14.
- 4 Attach your NIC to a switch or server using an ATTO recommended cable:
 - Optical (NS14, NS12, NS11)*
 - CBL-LCLC-R03 (3 Meter)
 - CBL-LCLC-R10 (10 Meter)
 - 10GBASE-T (NT12, NT11)*
 - CAT6a

FastFrame NS14 Adapter

FastFrame's comprehensive, easy-to-understand portfolio includes single-, dual-, and quad-port adapters with included high-quality SFP+ connectors - a hidden cost with some competitor cards - and support for direct attach copper cables. Quad-port adapters conserve PCI slots for more flexible system design. FastFrame™ draws up to 60% less power than competing solutions. A lower power rating means lower energy costs, lower data center maintenance fees, and fewer worries about heat dissipation. In addition to wide support for Windows and Linux server and desktop operating systems, ATTO leads in high performance I/O connectivity for Mac OS X environments.



Technical specifications

- Simultaneously supports multiple networking and storage protocols: TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s
- Jumbo frame support up to 9,000 bytes
- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

Host bus specifications

- x8 mechanical and x8 electrical PCI Express interconnect
- Conforms to PCI Express Base Spec 2.0
- Conforms to PCI Express CEM Spec 2.0
- PCI Hot Plug spec 1.0

Environmental & physical specifications

- Length: 6.52 inches
- Height: 4.375 inches
- Operating temperature: 0-55 °C (32-131 °F)
- Storage temperature: -40 to 70 °C (-40 to 158 °F)
- Relative humidity: 10 to 90% non-condensing
- 15.7 W (typical)
- 100 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

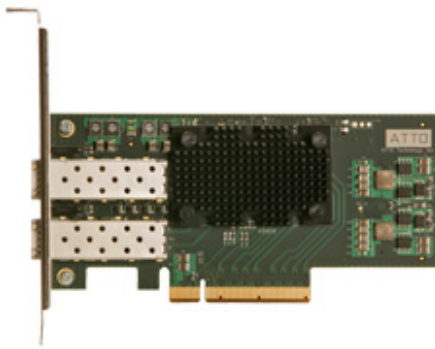
- Easy to install full height connection bracket
- External LEDs for on-line and speed status for each port
- Four pluggable optical LC SFP+ modules included

Software specifications

- Windows 8®, 7®, Vista®
- Windows Server® 2012, 2008, 2008 R2, 2003
- Mac OS® X (10.6 and up)
- Red Hat Enterprise Linux® 5.x
- Red Hat Enterprise Linux® 6.x
- SUSE Linux Enterprise® Server 10 & 11
- openSUSE™ 11.2 & 11.3
- Fedora™ 13 & 14

FastFrame NS12 Adapter

FastFrame's comprehensive, easy-to-understand portfolio includes single-, dual-, and quad-port adapters with included high-quality SFP+ connectors - a hidden cost with some competitor cards - and support for direct attach copper cables. FastFrame™ draws up to 60% less power than competing solutions. A lower power rating means lower energy costs, lower data center maintenance fees, and fewer worries about heat dissipation. In addition to wide support for Windows and Linux server and desktop operating systems, ATTO leads in high performance I/O connectivity for Mac OS X environments.



Technical specifications

- Simultaneously supports multiple networking and storage protocols: TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s
- Jumbo frame support up to 9,000 bytes
- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

Host bus specifications

- x8 mechanical and x8 electrical PCI Express interconnect
- Conforms to PCI Express Base Spec 2.0
- Conforms to PCI Express CEM Spec 2.0
- PCI Hot Plug spec 1.0

Environmental & physical specifications

- Length: 5.6 inches
- Height: 2.71 inches
- Operating temperature: 0-55 °C (32-131 °F)
- Storage temperature: -40 to 70 °C (-40 to 158 °F)
- Relative humidity: 10 to 90% non-condensing
- 5.9 W (typical)
- 100 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

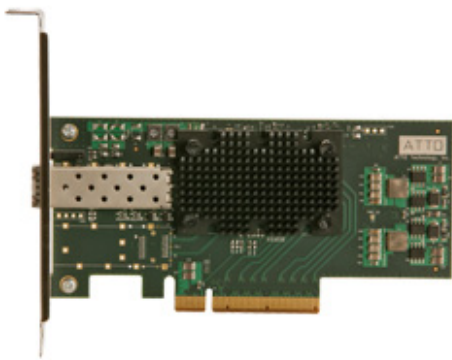
- Easy to install full height connection bracket; low-profile bracket included in finished goods packaging
- External LEDs for on-line and speed status for each port
- Two pluggable optical LC SFP+ modules included

Software specifications

- Windows 8®, 7®, Vista®
- Windows Server® 2012, 2008, 2008 R2, 2003
- Mac OS® X (10.6 and up)
- Red Hat Enterprise Linux® 5.x
- Red Hat Enterprise Linux® 6.x
- SUSE Linux Enterprise® Server 10 & 11
- openSUSE™ 11.2 & 11.3
- Fedora™ 13 & 14

FastFrame NS11 Adapter

FastFrame's comprehensive, easy-to-understand portfolio includes single-, dual-, and quad-port adapters with included high-quality SFP+ connectors - a hidden cost with some competitor cards - and support for direct attach copper cables. FastFrame™ draws up to 60% less power than competing solutions. A lower power rating means lower energy costs, lower data center maintenance fees, and fewer worries about heat dissipation. In addition to wide support for Windows and Linux server and desktop operating systems, ATTO leads in high performance I/O connectivity for Mac OS X environments.



Technical specifications

- Simultaneously supports multiple networking and storage protocols: FCoE, TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s
- Jumbo frame support up to 9,000 bytes
- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

Host bus specifications

- x8 mechanical and x8 electrical PCI Express interconnect
- Conforms to PCI Express Base Spec 2.0
- Conforms to PCI Express CEM Spec 2.0
- PCI Hot Plug spec 1.0

Environmental & physical specifications

- Length: 5.6 inches
- Height: 2.71 inches
- Operating temperature: 0-55 °C (32-131 °F)
- Storage temperature: -40 to 70 °C (-40 to 158 °F)
- Relative humidity: 10 to 90% non-condensing
- 4.7 W (typical)
- 100 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

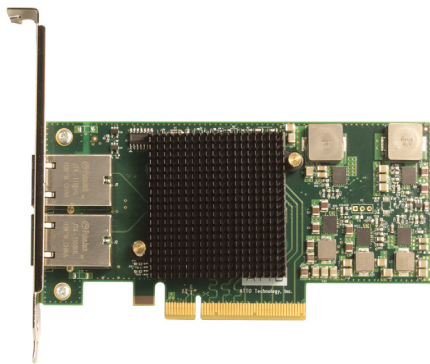
- Easy to install full height connection bracket; low-profile bracket included in finished goods packaging
- External LEDs for on-line and speed status for each port
- Pluggable optical LC SFP+ module included

Software specifications

- Windows 8®, 7®, Vista®
- Windows Server® 2012, 2008, 2008 R2, 2003
- Mac OS® X (10.6 and up)
- Red Hat Enterprise Linux® 5.x
- Red Hat Enterprise Linux® 6.x
- SUSE Linux Enterprise® Server 10 & 11
- openSUSE™ 11.2 & 11.3
- Fedora™ 13 & 14

FastFrame NT12 Adapter

Built on industry-leading Intel® silicon for universal usability, ATTO FastFrame NICs lead in high performance I/O connectivity for Mac OS X environments while offering broad support for Windows and Linux server and workstation operating systems. They provide reliable, inexpensive, fast network access to block storage via iSCSI, with lossless Ethernet (CEE) and Data Center Bridging (DCB) for improved iSCSI quality of service. New to the FastFrame family, ATTO FastFrame 10GBASE-T NICs operate with existing structured shielded or unshielded twisted pair copper cabling familiar to network professionals. 10GbE cards, ports & cabling are backwards compatible to Gig-E for staged upgrades or future-proofing— and you can run 10GBASE-T NICs with Cat6a cabling that's already in place.



Technical specifications

- Intel X540 10GBASE-T Ethernet Controller
- Simultaneously supports multiple networking and storage protocols: TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s, 1Gb/s, 100Mb/s
- Jumbo frame support up to 9,000 bytes

- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

Host bus specifications

- x8 mechanical and x8 electrical PCI Express 2.0 interconnect
- Backward compatible with PCI Express 1.1
- Supports PCI Express Base Spec 2.0
- Supports PCI Express CEM Spec 2.0

Environmental & physical specifications

- Length: 5.6 inches
- Height: 2.71 inches
- Operating temperature: 0-55 °C (32-131 °F)
- Storage temperature: -40 to 70 °C (-40 to 158 °F)
- Relative humidity: 10 to 90% non-condensing
- 13.6W (typical), 16.0W (max)
- 200 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

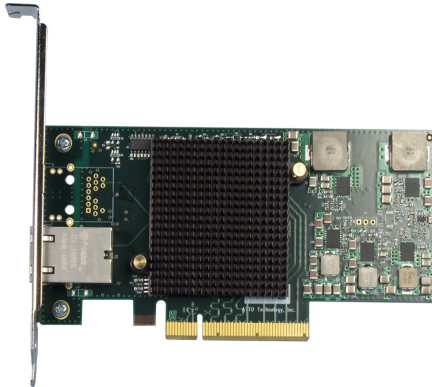
- Easy to install full height connection bracket; low-profile bracket included in finished goods packaging
- External LEDs for link speed and activity for each port
- Compatible with CAT-7, CAT-6a, and CAT-6 Ethernet cables for 10GBASE-T connections and CAT-5e for 1000BASE-T and 100BASE-TX connections

Software specifications

- Windows 8®, 7®, Vista®
- Windows Server® 2012, 2008, 2008 R2, 2003
- Mac OS® X (10.6 and up)
- Red Hat Enterprise Linux® 5.x
- Red Hat Enterprise Linux® 6.x
- SUSE Linux Enterprise® Server 10 & 11
- SUSE Linux Enterprise® Server 11 SP1
- Fedora™ 13 & 14
- CentOS 5 & 6

FastFrame NT11 Adapter

Built on industry-leading Intel® silicon for universal usability, ATTO FastFrame NICs lead in high performance I/O connectivity for Mac OS X environments while offering broad support for Windows and Linux server and workstation operating systems. They provide reliable, inexpensive, fast network access to block storage via iSCSI, with lossless Ethernet (CEE) and Data Center Bridging (DCB) for improved iSCSI quality of service. New to the FastFrame family, ATTO FastFrame 10GBASE-T NICs operate with existing structured shielded or unshielded twisted pair copper cabling familiar to network professionals. 10GbE cards, ports & cabling are backwards compatible to Gig-E for staged upgrades or future-proofing—and you can run 10GBASE-T NICs with Cat6a cabling that's already in place.



Technical specifications

- Intel X540 10GBASE-T Ethernet Controller
- Simultaneously supports multiple networking and storage protocols: TCP/IP, iSCSI
- 400,000 IOPs per port delivers high-throughput for critical applications
- Supports Data Center Bridging; Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and DCB Exchange (DCBX) protocol
- Up to 10Gb/s throughput per port
- High-performance x8 PCIe 2.0 bus

Ethernet features

- Data rate per port: 10Gb/s, 1Gb/s, 100Mb/s
- Jumbo frame support up to 9,000 bytes

- Tx/Rx IP, TCP & UDP checksum offloading (IPv4, IPv6) capabilities, Transmission control protocol (TCP), User datagram protocol (UDP), Internet protocol (IP)
- Large send offloads (LSO)

Host bus specifications

- x8 mechanical and x8 electrical PCI Express 2.0 interconnect
- Backward compatible with PCI Express 1.1
- Supports PCI Express Base Spec 2.0
- Supports PCI Express CEM Spec 2.0

Environmental & physical specifications

- Length: 5.6 inches
- Height: 2.71 inches
- Operating temperature: 0-55 °C (32-131 °F)
- Storage temperature: -40 to 70 °C (-40 to 158 °F)
- Relative humidity: 10 to 90% non-condensing
- 13.6W (typical), 16.0W (max)
- 200 lf/m (minimum) airflow recommended
- RoHS compliant

External connectivity

- Easy to install full height connection bracket; low-profile bracket included in finished goods packaging
- External LEDs for link speed and activity for each port
- Compatible with CAT-7, CAT-6a, and CAT-6 Ethernet cables for 10GBASE-T connections and CAT-5e for 1000BASE-T and 100BASE-TX connections

Software specifications

- Windows 8®, 7®, Vista®
- Windows Server® 2012, 2008, 2008 R2, 2003
- Mac OS® X (10.6 and up)
- Red Hat Enterprise Linux® 5.x
- Red Hat Enterprise Linux® 6.x
- SUSE Linux Enterprise® Server 10 & 11
- SUSE Linux Enterprise® Server 11 SP1
- Fedora™13 & 14
- CentOS 5 & 6

Selection guide: FastFrame adapters

Product Features	FFRM-NS14	FFRM-NS12	FFRM-NS11	FFRM-NT12	FFRM-NT11
Ports	4	2	1	2	1
Maximum Transfer Rate (Full Duplex)	8GB/s	5GB/s	2.5GB/s	5GB/s	2.5GB/s
Maximum Transfer Rate (Half Duplex)	4GB/s	2.5GB/s	1.25GB/s	2.5GB/s	1.25GB/s
Bus type	PCIe 2.0	PCIe 2.0	PCIe 2.0	PCIe 2.0	PCIe 2.0
Bus characteristics	8 lane	8 lane	8 lane	8 lane	8 lane
Optical/Copper interface	SFP+LC	SFP+LC	SFP+ LC	RJ45	RJ45
Maximum cable length	See Chart Below	See Chart Below	See Chart Below	See Chart Below	See Chart Below
Low profile form factor		✓	✓	✓	✓
Advanced Data Streaming (ADS™) Technology	✓	✓	✓	✓	✓
Windows support	✓	✓	✓	✓	✓
Mac OS driver support	✓	✓	✓	✓	✓
Linux driver support	✓	✓	✓	✓	✓

Cable length varies by interface and cable type.

Interface	Cable type	Max Distance
10GBASE-SR	62.5/125 µm multi-mode fiber (OM1)	26m
10GBASE-SR	50/125 µm MMF (OM2)	82m
10GBASE-SR	Laser optimized 50/125 µm MMF (OM3)	300m
10GBASE-T	CAT-7	100m
10GBASE-T	CAT-6a	100m
10GBASE-T	CAT-6	55m
1000BASE-T	CAT-5e	100m
1000BASE-TX	CAT-5e	100m

2 Hardware Installation

Install the ATTO FastFrame Adapter and attach your devices to it using the instructions below.



CAUTION

Back up your system data before changing or installing any hardware.

System requirements

The FastFrame NIC package contains the following:

- FastFrame Network Interface Adapter
- ATTO Utilities CD
- Warranty and registration card
- SFP+ Modules (NS adapters only)

If any of these items are missing, contact your ATTO authorized sales representative.

To install and use the FastFrame NIC you will need:

- 1 A computer with an available PCI Express expansion slot



Note

Install your FastFrame NIC into a PCIe 2.0 x8 expansion slot for best performance

- 2 The complete FastFrame NIC package

MAC address

FastFrame NICs are configured with a unique MAC address designated by the Institute of Electrical and Electronic Engineers. This address, stored in flash memory, allows the system to recognize the FastFrame NIC as a unique part of your configuration. The address is clearly marked on the back of the adapter.

The MAC address assigned to an adapter is assigned to the 1st port of the adapter. If the adapter has more than one port then MAC address is incremented by and assigned to the 2nd port, incremented by 2 and assigned to the 3rd port and incremented by 3 and assigned to the 4th port.

The assignment will be as follows:

MAC address	1st port of NS11, NS12 & NS14
MAC address + 1	2nd port of NS12 & NS14
MAC address + 2	3rd port of NS14
MAC address + 3	4th port of NS14

Installation



CAUTION

FastFrame NICs contain components that are sensitive to electrostatic discharge (ESD). ESD can cause damage to the FastFrame host adapter. Please follow standard methods to avoid ESD.

For bracket installation, please see the bracket installation guide included in your NIC product package.

- 1 Install the latest drivers. Refer to [Chapter 3 on page 14](#).
- 2 Power down the computer and unplug the computer from all power sources.
- 3 Open the case.
- 4 Remove the cover bracket from the PCI Express slot (v1.0a or later).
- 5 Install the FastFrame NIC host adapter in any open PCI Express expansion slot. If you have questions about how to install an expansion card in your system, consult your computer's documentation.



Note

The FastFrame adapters fit into x8 or x16 mechanical PCI Express slots.

- 6 Repeat step 4 through 5 for each adapter you want to install.
- 7 Close the case on the computer and power it up.

Bracket details

Exhibit 2-1 FFRM-NS14 Bracket

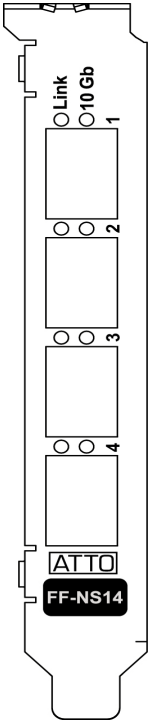


Exhibit 2-3 FFRM-NS11 Full & Low Profile Bracket

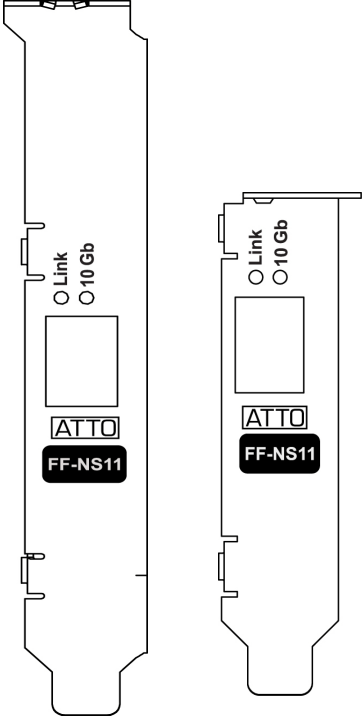


Exhibit 2-2 FFRM-NS12 Full & Low Profile Bracket

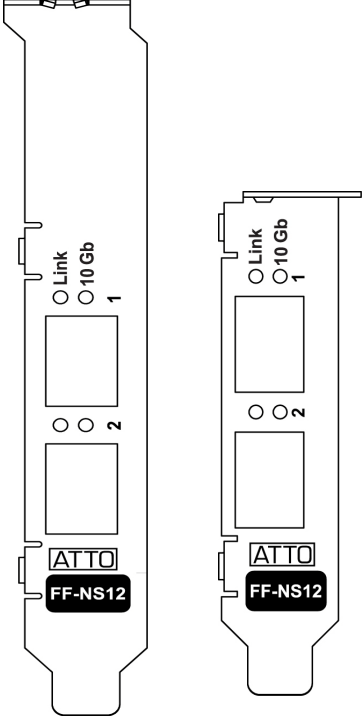


Exhibit 2-4 FFRM-NT12 Full & Low Profile Bracket

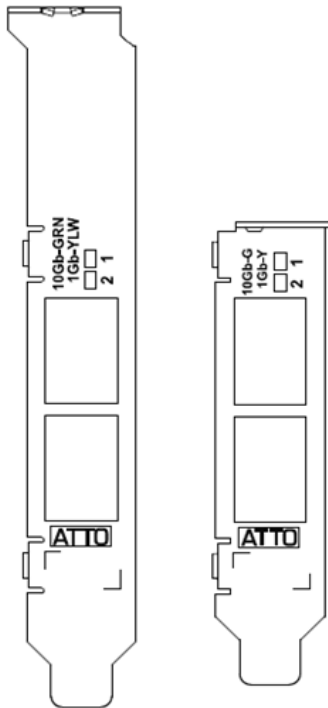
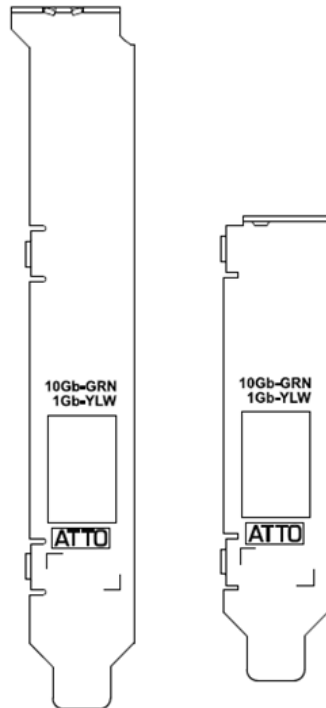


Exhibit 2-5 FFRM-NT11 Full & Low Profile Bracket



Adapter board details

Exhibit 2-6 FFRM-NS14 board

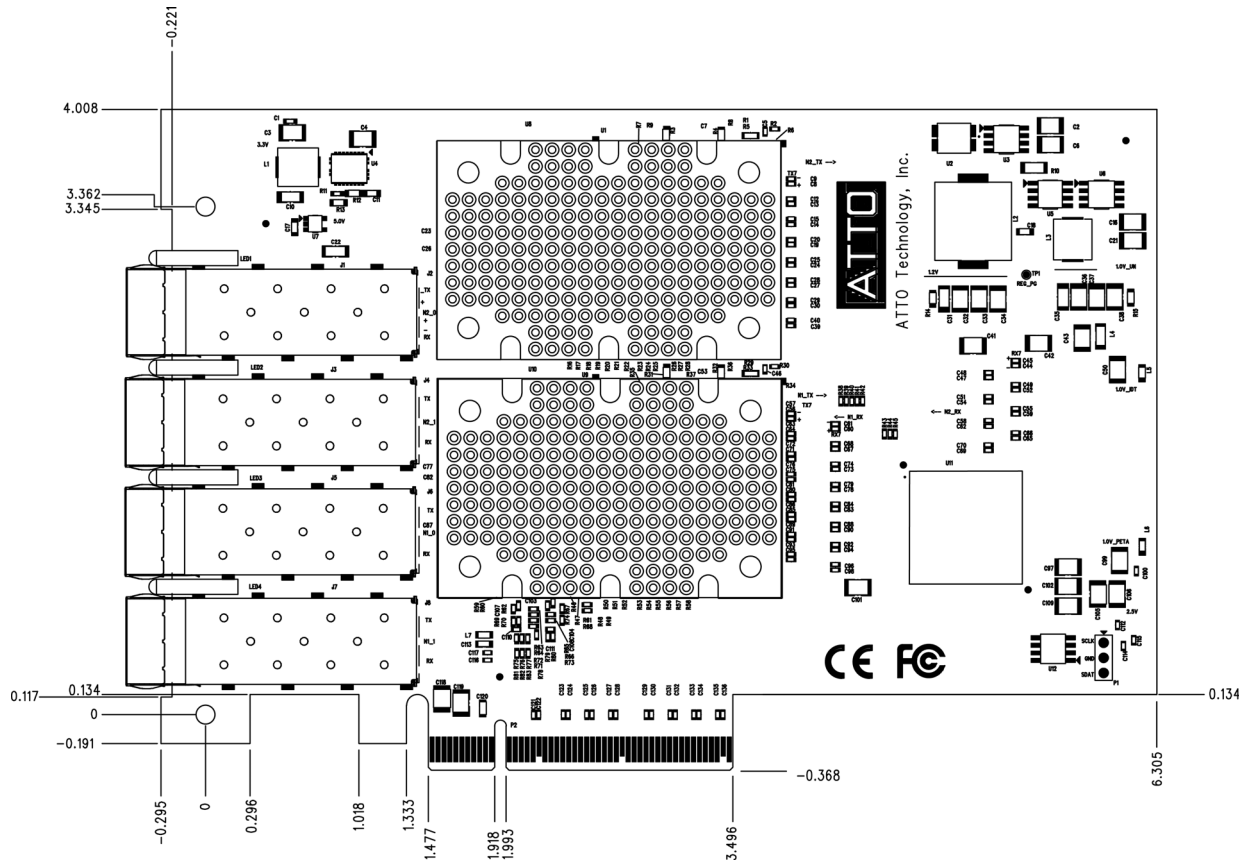


Exhibit 2-7 FFRM-NS12 board

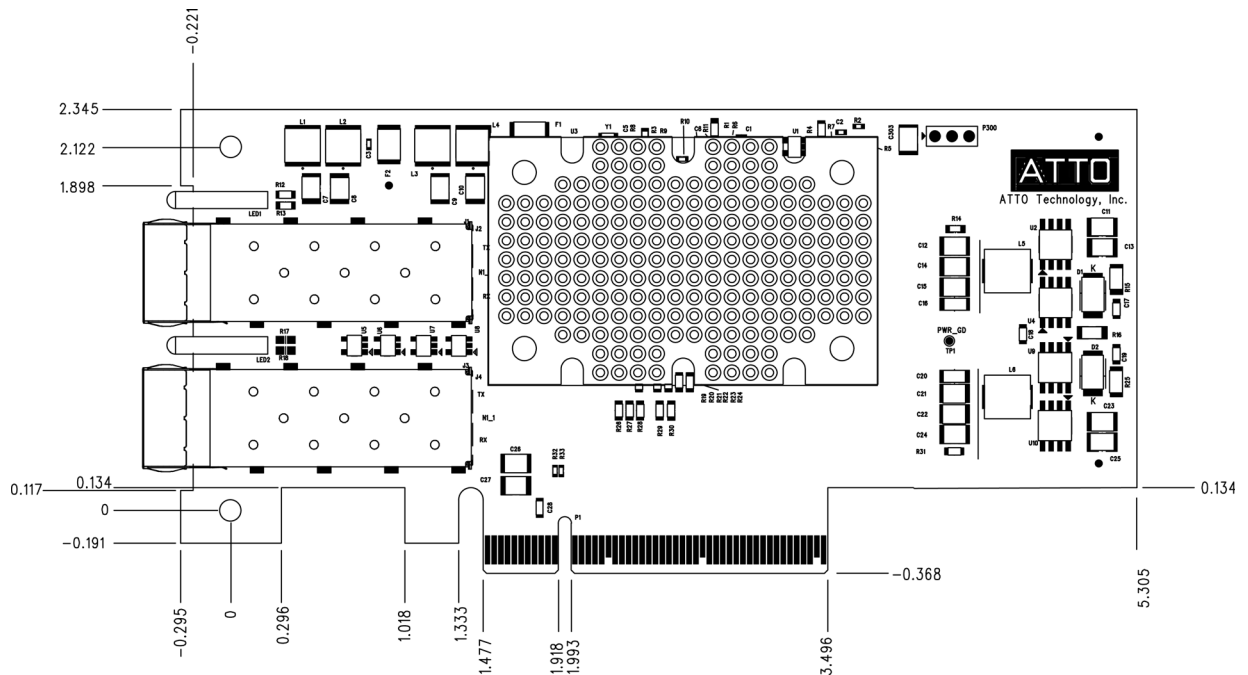


Exhibit 2-8 FFRM-NS11 board

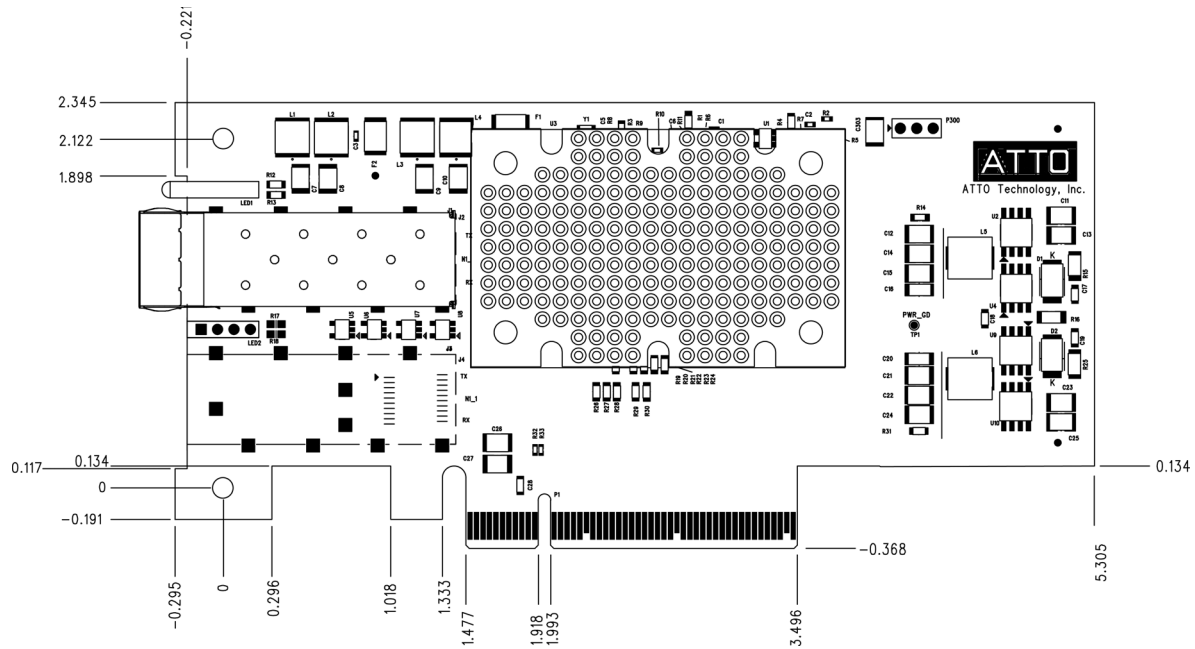


Exhibit 2-9 FFRM-NT12 board

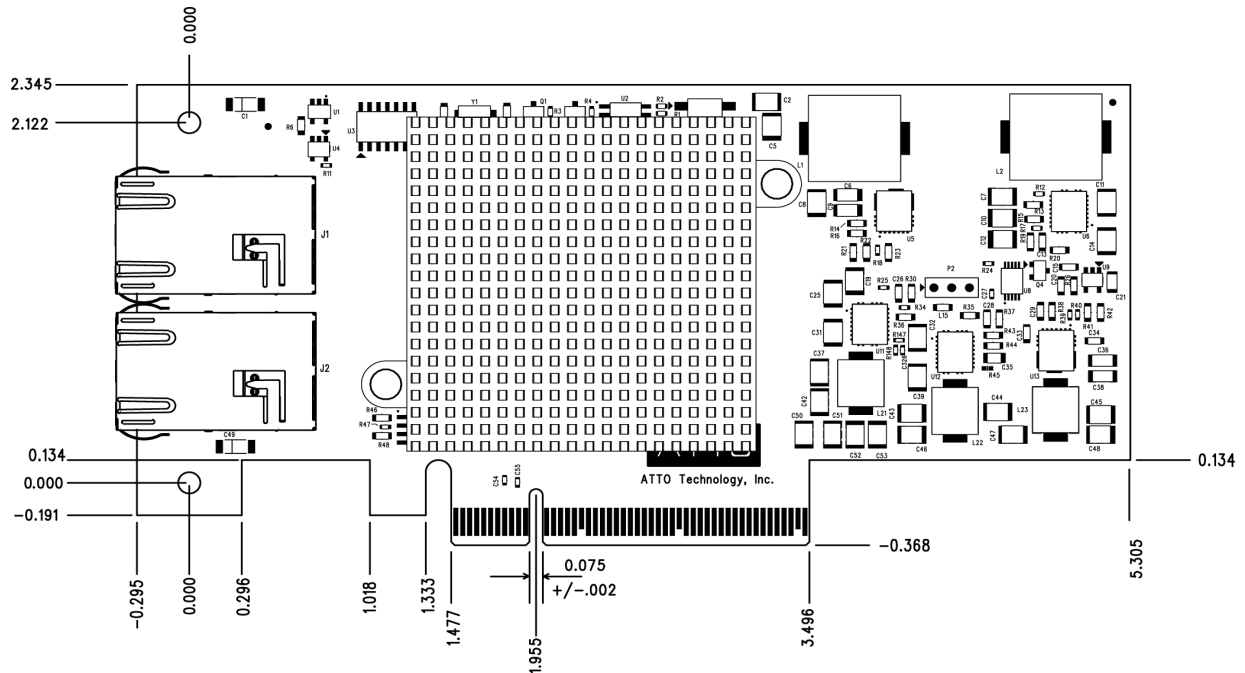
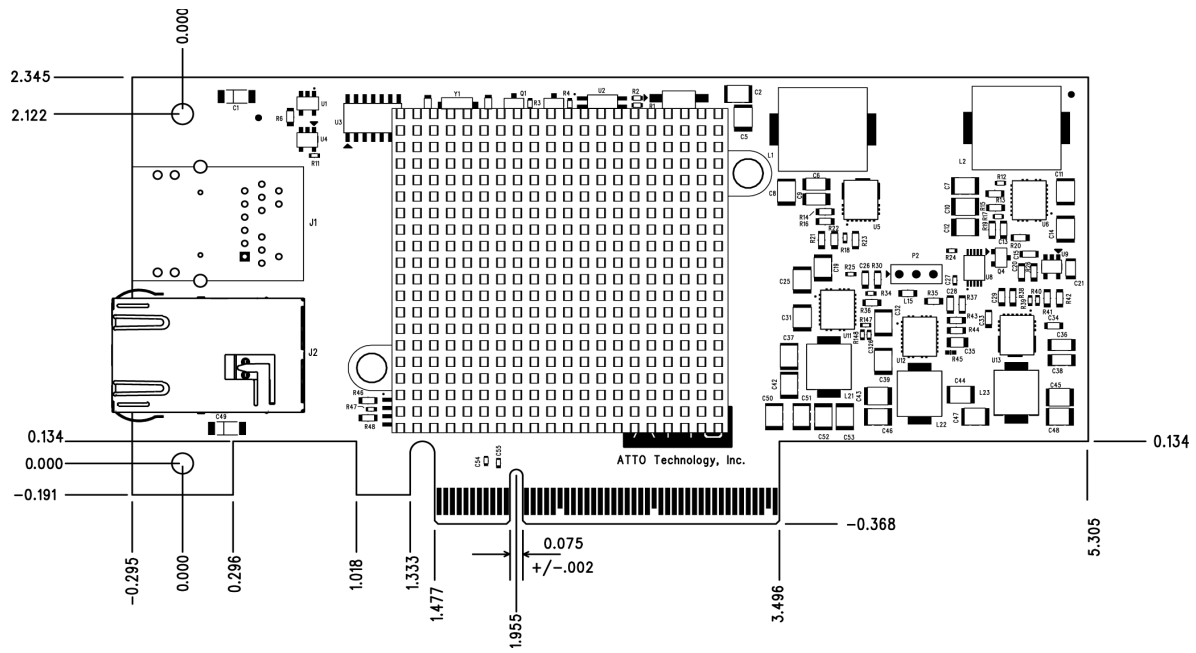


Exhibit 2-10 FFRM-NT11 board



3 Install Drivers

Before installing your FastFrame adapter, you must configure your system to recognize it by installing drivers for your operating system.



Note

If you already have one or more FastFrame adapters installed and you are installing additional adapter(s), you do not need to perform any of these procedures unless you are updating a previously installed driver.

The FastFrame NIC Installation CD, referred to in these instructions, is the Installation CD that shipped with your adapter. This CD contains the drivers for OS X and the manuals for the FastFrame products. It is recommended that the ATTO download page is checked to get the latest OS X driver. You must follow the directions below to get the installation package for the OS X operating system.

This CD does not include drivers for Windows or Linux operating systems. You must follow the directions below to get the driver installation packages for Windows and Linux operating systems.

Windows

Intel Website (NS14, NS12, NS11, NT12, NT11)



Note

Windows 8, 7, Vista, Server 2012 and 2008 may utilize a new User Account Control Feature. Because of this there may be additional confirmations that will need to be performed to properly install the driver. These confirmations normally consist of a dialog where the user has to give Windows permission to perform an action. If you do not have the correct privileges during this, you will be prompted for an actual user name and password. You may need to contact your system administrator if you do not have this information.

- 1 Download the latest install package from the Intel support website at http://www.intel.com/p/en_US/support and transfer it to the system.
- 2 Select the Intel X540-T2 Ethernet Controller or the Intel 82599 10 Gigabit Ethernet Controller. The download files are the same and they are appropriate for the FastFrame NIC controllers.
- 3 Select the version of Windows on which the driver will run. Then select either the ProWin32.exe or the ProWinx64.exe file based upon the Windows installation of 32-bit or 64-bit.
- 4 Download the file.
- 5 Start the installation by double clicking the downloaded follow.
- 6 Follow the instructions to install the NIC driver.

Linux

Intel Website (NS14, NS12, NS11, NT12, NT11)



Note

These steps assume a basic knowledge of Linux terminal commands. You must also have the correct kernel header files for the appropriate kernel already installed.

- 1 Download the latest install package from the Intel support website at http://www.intel.com/p/en_US/support and transfer it to the system.
- 2 Select the Intel X540-T2 Ethernet Controller or the Intel 82599 10 Gigabit Ethernet Controller. The download files are the same and they are appropriate for the FastFrame NIC controllers.
- 3 Select the latest driver for Network Connections under Linux.
- 4 Download the file.
- 5 There is a Read Me (txt) file that provides instructions on building the Linux driver. Follow those directions to install the NIC driver under Linux.

Mac OS X

ATTO Website (NS14, NS12, NS11, NT12, NT11)

- 1 Go to <http://www.attotech.com/downloads.html>
- 2 Log in. First-time visitors will be required to complete registration.
- 3 Under 'Select Product' choose **Ethernet Adapters**.
- 4 Select **10GbE Network Interface Cards**.
- 5 Download the latest Mac driver.
- 6 Open the driver from the location in which it was saved.
- 7 Follow the on-screen instructions.

Installation CD (NS14, NS12, NS11, NT12, NT11)

- 1 Power on your system and log in as the administrator or a user with proper administrative privileges.
- 2 Insert the Installation CD.
- 3 After the CD mounts, open the FastFrame volume on the desktop.
- 4 Open the Drivers folder.
- 5 Open the folder corresponding to the OS X version in use.
- 6 Launch the installer package.
- 7 Follow the on-screen instructions.

4 Updating Drivers

Your FastFrame NIC should ship with the latest flash and drivers, but these may need to be updated as new versions become available. Visit the ATTO website, www.attotech.com, to download the latest drivers and flash bundle.

Updating Windows drivers

- 1 Download the latest install package from the Intel support website at http://www.intel.com/p/en_US/support and transfer it to the system.
- 2 Select the Intel X540-T2 Ethernet Controller or the Intel 82599 10 Gigabit Ethernet Controller. The download files are the same and they are appropriate for the FastFrame NIC controllers.
- 3 Select the version of Windows on which the driver will run. Then select either the ProWin32.exe or the ProWinx64.exe file based upon the Windows installation of 32-bit or 64-bit.
- 4 Download the file.
- 5 Start the installation by double clicking the downloaded follow.
- 6 Follow the instructions to install the NIC driver.

Updating OS X drivers

- 1 Go to <http://www.attotech.com/downloads.html>
- 2 Log in. First-time visitors will be required to complete registration.
- 3 Under 'Select Product' choose **Ethernet Adapters**.
- 4 Select **10GbE Network Interface Cards**
- 5 Download the latest Mac driver.
- 6 Open the driver from the location in which it was saved.
- 7 Follow the on-screen instructions.

Updating Linux drivers

- 1 Download the latest install package from the Intel support website at http://www.intel.com/p/en_US/support and transfer it to the system.
- 2 Select the Intel X540-T2 Ethernet Controller or the Intel 82599 10 Gigabit Ethernet Controller. The download files are the same and they are appropriate for the FastFrame NIC controllers.
- 3 Select the latest driver for Network Connections under Linux.
- 4 Download the file.
- 5 There is a Read Me (txt) file that provides instructions on building the Linux driver. Follow those directions to install the NIC driver under Linux.

5 Troubleshooting

This chapter contains solutions for the most common problems you might encounter. If you need additional assistance, please refer to the ATTO Technology website, www.attotech.com, or contact an authorized ATTO Technology representative.

General suggestions

- Check each cable connection on every device.
- Verify all cables are in proper working condition. Loose or broken cables are often the cause of errors or problems.
- Check that connected devices are plugged into an AC outlet and are turned on before you add power to your computer.

Windows Server 2012, 2008, 2003; Windows 8, 7, Vista

- If working properly the NIC should appear in the Device Manager.
- If the FastFrame NIC does not appear under the Network Adapters:
 - a. Remove power from the PC.
 - b. Open the case.
 - c. Check that the FastFrame NIC adapter is properly seated in the PCI slot.
 - d. Replace the case and apply power.
- If the adapter has been identified but there is an exclamation point (!) on the listing:
 - a. Right click on the listing and select Uninstall.
 - b. Reload the driver (see [Updating Windows drivers](#) on page 16).
 - c. Reboot the system and repeat the installation process.

If problems persist, contact your authorized ATTO Technology representative.

Linux

- 1 Verify the FastFrame driver is loaded with the `lsmod` command. If `lsmod` does not show the driver, refer to the installation instructions to install and load the driver in [Updating Windows drivers](#) on page 16.
- 2 Check the system log with the command `dmesg`. The FastFrame driver creates status messages during initialization. Make sure that all installed cards are properly detected and initialized.
- 3 Examine the contents of the file(s): `/proc/scsi/fastframe/x`, where x is the adapter's host number. This file contains details such as link status, connection speed and discovered devices.



Note

*Advanced users only. Modify the **driver makefile** to enable debugging information. Upon loading, the **FastFrame driver** displays detailed debugging information which may help troubleshoot the problem.*

Mac OS X



Note

The ATTO FastFrame supports Mac OS X versions 10.6.x and later.

- 1 Open the ATTO ConfigTool from the ATTO Utilities CD or download it from the ATTO website. Refer to the ATTO Utilities Installation and Operations Manual for additional information.
- 2 If the adapter does not appear in the System Profiler, make sure the card is seated properly in the PCIe slot.
 - a. Shut down and remove power from the Mac.
 - b. Remove the side of the case.
 - c. Check the PCIe slot
 - d. Replace the side of the case.
 - e. Apply power



Note

If the Fastframe adapter is properly seated and devices are still not accessible check the cable to verify the link light is illuminated. If not contact an authorized ATTO representative.

- 3 Verify the driver is loaded.

- a. Click on the adapter name in the Device Listing to view the Basic Info screen.
- b. If the Driver Information section indicates Unknown: driver not loaded, reinstall the driver. Refer to Updating Hardware Flash Drivers on page 25.
- c. If reinstalling the driver does not fix the problem, contact an authorized ATTO representative.

- 4 Reset the NVRAM for all channels to defaults and reboot. If the problem persists, contact an authorized ATTO representative.



Note

When calling ATTO Technical Support please have a printout of the IOreg listing, Apple System Profiler, Serial number of the adapter, and what driver and firmware that is currently loaded in your Apple computer.

Appendix A Glossary

Some terms used in the Network Interface industry are defined below. More information is available through the ATTO Technology website (www.attotech.com) and the Storage Area Networking Industry Association (www.snia.org).

Term	Definition
ANSI	American National Standards Institute
BER	Bit Error Rate: a measure of transmission accuracy; the ratio of bits received in error to bits sent
bit	smallest unit of data a computer can process: a single binary digit with a value of either 0 or 1
bus	a collection of unbroken signal lines used to transmit information from one part of a computer system to another; taps on the lines connect devices to the bus
byte	an ordered set of 8 bits
channel	a point-to-point link which transports data from one point to another
CPU	Central Processing Unit: the portion of the computer that actually performs computations
CRC	Cyclic Redundancy Check: an error-correcting code which calculates a numeric value for received and transmitted data; if no error has occurred during transmission, the CRC for both received and transmitted data should be the same
device driver	a program that allows a microprocessor to direct the operation of a peripheral device
DMA	Direct Memory Access: a way to move data from a storage device directly to RAM without using the CPU's resources
DMA bus master	allows a peripheral to control the flow of data to and from system memory by block as opposed to allowing the processor to control the data by bytes (PIO or programmed I/O)
full-duplex	a communication protocol which allows transmission in both directions at the same time
half duplex	a communication protocol which allows transmission in both directions, but only one direction at a time
host	a processor, usually a CPU and memory, which communicates with devices over an interface
initiator device	a component which originates a command
LED	Light-emitting diode: a type of diode that emits light when current passes through it; visible LEDs are used as indicator lights on all sorts of electronic devices
LUN	Logical Unit Number: an identifier for a logical unit (0-7)
MAC	Media Access Controller
MAC Address	A unique address assigned to an ethernet device
multi-mode fiber	an optical fiber which can carry several beams of light at once
N_port	a port attached to a node used with point to point or fabric configurations
originator	an initiating device; a component which originates a command
parity checking	a method which verifies the accuracy of data transmitted over the SCSI bus by adding one bit in the transfer to make the sum of all the bits either odd or even (for odd or even parity); an error message occurs if the sum is not correct
PCI	Peripheral Component Interconnect. Allows peripherals to be connected directly to computer memory, bypassing the slower ISA and EISA busses
point-to-point	a topology where two ports communicate
port	an access point in a device: see N_port, NL_port, etc.
port address	also port number; the address, assigned by the PCI bus, through which commands are sent to a host adapter board
port number	see port address
receiver	the ultimate destination of data transmission; a terminal device

Term	Definition
scatter/gather	a device driver feature which allows the host adapter to modify a transfer data pointer so that a single host adapter can access many segments of memory, minimizing interrupts and transfer overhead
single-mode fiber	an optical fiber with a small core which supports one wavelength (ray of light); the core radius is nearly equal to the wavelength of the source
SNMP	Simple Network Management Protocol: a standard for monitoring network-attached devices
topology	logical layout of the parts of a computer system or network and their interconnections
transceiver	a transmitter/receiver module
transfer rate	the rate at which bytes or bits are transferred, as in megabytes or gigabits per second

Appendix B Accessories

The following accessories are available through ATTO Technology and authorized resellers. Contact an ATTO Technology authorized sales representative to order.

Optical Cables

CBL-FCFI-05x5 m. cable – Duplex 50 Micron Multi-mode FC/Optical

CBL-LCSC-0033 m. 50/125 optical cable (LC to SC)

CBL-LCSC-01010 m. 50/125 optical cable (LC to SC)

A variety of Fibre Channel, SAS and SCSI products are also available from ATTO Technology. Please contact your ATTO sales representative for product descriptions and part number information.

Fibre Channel solutions

ATTO Celerity™ Family of Fibre Channel Host Adapters

SCSI solutions

ATTO ExpressPCI Family of SCSI Host Adapters (see Appendix C)

SAS/SATA Solutions

ATTO ExpressSAS family of SAS Host and RAID Adapters (see Appendix C)

Software

ATTO ConfigTool – Configuration and management software

ATTO Express Power Center – Windows & Mac OS X RAID 0 and benchmark software

Appendix C ATTO Adapter Selection Guides

Contact your ATTO representative or visit the ATTO website for details on all ATTO products.

ExpressPCI SCSI host adapters

Product Features	Ultra 320 SCSI		
	UL5D	UL5D LP	UL4D
Max. transfer rate (MB/sec.)	640MB/s	640MB/s	640MB/s
Low Voltage Differential	•	•	•
Single-ended SCSI	•	•	•
Number of SCSI Channels (internal/external)	2/2	0/2	2/2
Number of SCSI IDs supported	30	30	30
Low profile		•	
Large file transfers	•	•	•
Cable distances (m)	12.5	12.5	12.5
32-bit PCI compatible			•
64-bit PCI compatible			•
33 MHZ PCI			•
133 MHZ PCI-X			•
66 MHz PCI			•
x4 PCI Express	•	•	
Windows 2000/XP, Server 2003/2008/Vista support	•	•	•
Linux support	•	•	•
Mac OS X support	•	•	•
Novell Netware support	•	•	•
RoHS compliant	•	•	•

ExpressSAS 6 Gb Host Adapters

Product Features	H6F0 GT	H6F0	H60F	H680	H608	H644
Max Data Rate	6Gb/s	6Gb/s	6Gb/s	6Gb/s	6Gb/s	6Gb/s
x8 PCI Express	•	•	•	•	•	•
Number of ports	16	16	16	8	8	8
Port configuration external/internal	16/0	16/0	0/16	8/0	0/8	4/4
Connector type	4 mini SAS (x4) SFF-8644 external	4 mini SAS (x4) SFF-8088 external	4 mini SAS (x4) SFF-8087 internal	2 mini SAS (x4) SFF-8088 external	2 mini SAS (x4) SFF-8087 internal	1 mini SAS (x4) SFF-8088 external 1 mini SAS (x4) SFF-8087 internal
Number of devices supported	2048 end-point devices	512 end-point devices	512 end-point devices	256 end-point devices	256 end-point devices	256 end-point devices
1.5 Gb SATA support	•	•	•	•	•	•
3 Gb SATA II support	•	•	•	•	•	•
3 Gb SAS support	•	•	•	•	•	•
6 Gb SATA II support	•	•	•	•	•	•
6 Gb SAS support	•	•	•	•	•	•
Software RAID	0	0	0	0	0	0
Cable distances	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA	up to 8m SAS, 1m SATA
Advanced Data Streaming™	•	•	•	•	•	•
32-bit support	•	•	•	•	•	•
64-bit support	•	•	•	•	•	•
Windows	•	•	•	•	•	•
Linux	•	•	•	•	•	•
Mac OS X	•	•	•	•	•	•
VMware	•	•	•	•	•	•
Low profile	•	•	•	1/2 height	1/2 height	1/2 height

ExpressSAS 6 Gb RAID Adapters

Product Features	R60F	R680	R608	R644
Max Data Rate	6Gb/s	6Gb/s	6Gb/s	6Gb/s
x8 PCI Express	•	•	•	•
Number of ports	16	8	8	8
Port configuration external/internal	0/16	8/0	0/8	4/4
Connector type	4 mini SAS (x4) SFF-8087 internal	2 mini SAS (x4) SFF-8088 external	2 mini SAS (x4) SFF-8087 internal	1 mini SAS (x4) SFF-8088 external 1 mini SAS (x4) SFF-8087 internal
Number of devices supported	128 SAS/SATA targets	128 SAS/SATA targets	128 SAS/SATA targets	128 SAS/SATA targets
1.5 Gb SATA support	•	•	•	•
3 Gb SATA II support	•	•	•	•
3 Gb SAS support	•	•	•	•
6 Gb SATA II support	•	•	•	•
6 Gb SAS support	•	•	•	•
Software RAID	0, 40, 50, 60	0, 40, 50, 60	0, 40, 50, 60	0, 40, 50, 60
Integrated RAID	0, 1, 4, 5, 6 JBOD, DVRAID	0, 1, 4, 5, 6 JBOD, DVRAID	0, 1, 4, 5, 6 JBOD, DVRAID	0, 1, 4, 5, 6 JBOD, DVRAID
RAID Management Utility	•	•	•	•
Global Hot Spares	•	•	•	•
Event notification	E-mail, pop-up, log file	E-mail, pop-up, log file	E-mail, pop-up, log file	E-mail, pop-up, log file
SNMP	•	•	•	•
Memory (ECC)	512 MB	512 MB	512 MB	512 MB
Cable distances	up to 10m SAS, 1m SATA	up to 10 SAS, 1m SATA	up to 10m SAS, 1m SATA	up to 10m SAS, 1m SATA
Advanced Data Streaming™	•	•	•	•
32-bit support	•	•	•	•
64-bit support	•	•	•	•
Windows	•	•	•	•
Linux	•	•	•	•
Mac OS X	•	•	•	•
Low profile	•	•	•	•

Celerity 8-Gb Adapters

Product Features	FC-84EN	FC-82EN	FC-81EN
Fibre Channel Ports	4	2	1
FC protocol	8-Gb	8-Gb	8-Gb
Maximum Transfer Rate (Full Duplex)	6.4GB/s	3.2GB/s	1.6GB/s
Maximum Transfer Rate (Half Duplex)	3.2GB/s	1.6GB/s	800MB/s
Bus type	PCIe 2.0	PCIe 2.0	PCIe 2.0
Bus characteristics	8 lane	8 lane	4 lane
Optical interface	SFP+LC	SFP+LC	SFP+ LC
Maximum cable length	300m@2-Gb 150m@4-Gb 50m@8-Gb	300m@2-Gb 150m@4-Gb 50m@8-Gb	300m@2-Gb 150m@4-Gb 50m@8-Gb
Low profile form factor		✓	✓
Advanced Data Streaming (ADS™) Technology	✓	✓	✓
Software RAID support ¹	✓	✓	✓
Developer's kit (Target Mode & API)	✓	✓	✓
Windows support	✓	✓	✓
Linux driver support	✓	✓	✓
Macintosh OS X driver support	✓	✓	✓
VMware driver support	✓	✓	✓
1 ATTO Express Power Center recommended			

Appendix D Standards, Compliances

The Technical Specification sheet for each FastFrame CNA lists certifications for that model. Models covered by this page include the FastFrame FFRM-NS14, FFRM-NS12, FFRM-NS11, FFRM-NT12, FFRM-NT11

FCC standards: radio and television interference



This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Canadian standards



This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

European standards

Declaration of Conformity



This following statement applies to all FastFrame adapter.

This device has been tested in the basic operating configuration and found to be compliant with the following European Union standards: Application of Council Directive: 2004/108/EC Standard(s) to which conformity is declared: EN55024:2010; EN55022:2010 CLASS B.

This Declaration will only be valid when this product is used in conjunction with other CE approved devices and when the entire system is tested to the applicable CE standards and found to be compliant

Japanese standards

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

Voluntary Control Council for Interference by Information Technology Equipment (VCCI, Japan)

This is a Class B product based on the standard of the Voluntary Control Council for Interference from Information Technology Equipment (VCCI). If this is used near a radio or television receiver in a domestic environment, it may cause radio interference. Install and use the equipment according to the instruction manual.

Compliances



ATTO FastFrame cards comply with Directive 2002/95/EC on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS). Contact your ATTO representative regarding RoHS compliant products.

The FastFrame family of adapters take the following RoHS exemptions:

7(a) - Lead in high melting temperature type solders (i.e. lead based alloys containing 85% by weight or more lead).

7(c)-I - Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, (e.g. piezoelectric devices, or in a glass or ceramic matrix compound).

7(c)-III - Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V DC.

13(a) - Lead in white glasses used for optical applications.

15 - Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit flip chip packages.

 ATTO Technology, Inc.	China RoHS Status Certificate 中国 RoHS 认证概况					
	Table of Toxic and Hazardous Substances/Elements and their Content 有毒有害物质 / 成分及其含量表					
	Toxic and Hazardous Substances and Elements					
Part Name (部件名称)	Lead (Pb) 铅	Mercury (Hg) 汞	Cadmium (Cd) 镉	Hexavalent Chromium (Cr6) 六价铬	Polybrominated biphenols (PBB) 多溴联苯	Polybrominated diphenyl ethers (PBDE) 多溴二苯醚
FFRM-NS14 Host Bus Adapter 主机总线 适配器	X	O	O	O	O	O
FFRM-NS12 Host Bus Adapter 主机总线 适配器	X	O	O	O	O	O
FFRM-NS11 Host Bus Adapter 主机总线 适配器	X	O	O	O	O	O
FFRM-NT12 Host Bus Adapter 主机总线 适配器	X	O	O	O	O	O
FFRM-NT11 Host Bus Adapter 主机总线 适配器	X	O	O	O	O	O
Notes 注意: O: Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006. O: 表明该部件的所有同 种 材料中本有毒或有害物质 的含量符合 SJ/T11363-2006 标准所要求的限量。 X: Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006. X: 表明该部件使用的同 种 材料中, 至少有一种材料的有毒或有害物质 的含量超过 SJ/T11363-2006 标准所要求的限量。						

The Environment-Friendly Use Period (EFUP) for all enclosed products and their parts are per the symbol shown here, unless otherwise marked. Certain fieldreplaceable parts may have a different EFUP (for example, battery modules) number. The Environment-Friendly Use Period is valid only when the product is operated under the conditions defined in the product manual.

除非另有特别的标注,此标志为针对所涉及产品的环保使用期限标志。某些可更换的零部件可能会有一个不同的环保使用期限(例如,电池单元模块)。此环保使用期限只适用于产品在产品手册中所规定的条件下工作。



Appendix E Safety, Warranty

All ATTO host adapter products have been tested to meet applicable safety standards when operated in proper electrical and thermal environments.

Safety

Please review the specifications for your specific host adapter before installing and operating it in any computer system to ensure compatibility.

Installation

Before installing an ATTO host adapter product into your computer system, unplug the computer from its electrical power source and allow adequate time for electrical discharge and the internal components to cool down before removing the computer system cover. This will decrease the risk of personal injury from electrical shock or touching the hot surface of an electrical component.

Once an ATTO host adapter is installed in a computer system, the computer cover must be reinstalled properly before turning the computer system back on.

Operation

ATTO host adapters require adequate cooling to function properly. If you have any questions as to the airflow provided by your computer system, please refer to your computer system manual or contact your computer system manufacturer.

To facilitate proper air circulation, ATTO host adapters should never be operated in a computer system without the cover installed or with an inoperable fan as this may cause safety or thermal problems which could damage the ATTO host adapter and void the warranty.

ATTO Technology, Inc. limited warranty

ATTO Technology, Inc. warrants to the original purchaser of this product that it is free from defects in material and workmanship as described in the ATTO Technology website, www.attotech.com, for three years.

ATTO Technology, Inc. liability shall be limited to replacing or repairing, at its option, any defective product. There is no charge for parts or labor should ATTO Technology, Inc. determine that this product is defective.

Products which have been subject to abuse, misuse, alteration, neglected, or have been serviced, repaired or installed by unauthorized personnel shall not be covered under this warranty provision. Damage resulting from incorrect connection or an inappropriate application of this product shall not be the responsibility of ATTO Technology, Inc. Liability is limited to ATTO Technology, Inc. product(s); damage to other equipment connected to ATTO Technology, Inc. product(s) is the customer's responsibility.

This warranty is made in lieu of any other warranty, express or implied. ATTO Technology, Inc. disclaims any implied warranties of merchantability or fitness for a particular purpose.

ATTO Technology, Inc. responsibility to repair or replace a defective product is the sole and exclusive remedy provided to the customer for breach of this warranty. ATTO Technology, Inc. is not liable for any indirect, special, incidental, or consequential damages irrespective of whether ATTO Technology, Inc. has advance notice of the possibility of such damages.

No ATTO Technology, Inc. dealer, agent or employee is authorized to make any modification, extension or addition to this warranty.